

REMARKS

Claims 1-16 are pending in the application. New claims 17 and 18 have been added to the application. Therefore, claims 1-18 are at issue.

The courteous telephonic interview granted by Examiner Zemel to applicants' undersigned attorney is hereby noted with appreciation. During the interview, the examiner's comments set forth in the Advisory Action of March 18, 2008 and proposed amendments were discussed in detail.

In particular, the Advisory Action stated that "the claimed polymers are not even required to be hydrophilic prior to surfactant treated [sic]" was discussed. Applicants' attorney noted, and the examiner then recognized, that the claims recite "water-absorbent open-celled crosslinked acid-functional addition polymer," thereby *requiring* the polymer to be hydrophilic.

Applicants also addressed the examiner's statement in the Advisory Action that the amount of surfactant applied to the surface is not specified in claims. This statement is addressed below and in the amended claims.

In the present amendment, independent claims 1 and 11 have been amended to recite that the amount of surfactant on a surface of the formed article is 0.1 to 10%, by weight, based on the weight of the foam. Claims 5 and 14 have been amended to recite that the amount of surfactant is 0.5 to 2%, by weight. Support for this amendment can be found in the specification at page 4, lines 14-17. These amendments address the examiner's statement in the Advisory Action that the claims do not specify an amount of surfactant.

New claims 17 and 18 recite an unexpected feature of the present invention, i.e., a *reduction* in droplet acquisition time when a hydrophilic surfactant is applied to a hydrophilic polymer. This unexpected result is described more fully hereafter. Support for new claims 17 and 18 can be found in the specification at page 15, in Example 3 and the Table, wherein a surfactant-treated foam surface demonstrated a reduction in droplet acquisition time from 1.5 seconds to 1 second (i.e., a 33⅓ reduction) compared to the identical polymer foam lacking a surfactant applied to the surface.

The present invention is directed to water-absorbent, i.e., hydrophilic, hydrogel foams having improved liquid acquisition properties compared to prior hydrogel foams, for example as disclosed in cited WO 99/44648 and WO 00/52087. The improved liquid acquisition properties are attributed to treating a surface of an already formed hydrogel foam with a sufficient amount of surfactant, as claimed. This surfactant treatment is *in addition to* a surfactant that may be present during preparation of a hydrogel foam, and the surfactant is applied in a sufficient amount to reduce the liquid acquisition time of the hydrogel foam, as recited in new claims 17 and 18.

It also must be noted that the presently claimed article is "formed from a water-absorbent open-celled crosslinked acid-functional addition polymer" (claims 1 and 11), such as a crosslinked polymer of acrylic acid (claims 8 and 15). Accordingly, the present claims *are* directed to an article prepared from a *hydrophilic* polymer, and more particularly a superabsorbent polymer capable of absorbing large amounts of aqueous media.

Claims 1-16 stand rejected under 35 U.S.C. §103 as being obvious over WO 99/44648 (WO '648) or WO 00/52087 (WO '087) in combination with U.S. Patent Publication No. 2002/0082311 ('311). For convenience, in addressing this rejection, applicants will refer to U.S. Patent No. 6,455,600 ('600), which corresponds to WO '648, and to U.S. Patent No. 6,750,262, which corresponds to WO '087.

The basis of the rejection is that the '600 patent and the '262 patent disclose an open-celled foam comprising acrylic acid, as set forth in the Examples of the '600 and '262 patents. The foam is prepared in the presence of a surfactant, and the foam can be treated with a silicon dioxide. As set forth in Amendment "A", and recognized by the examiner, neither the '600 patent nor the '262 patent discloses treatment of a foam surface with *an additional* amount of surfactant. The examiner relies upon the '311 publication for a teaching of treating a foam surface with a surfactant, and contends that it would have been obvious for a person skilled in the art to treat a foam surface of the '600 or '262 patent with a surfactant, as set forth in the '311 publication. Applicants traverse this rejection.

The U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-obviousness under 35 USC §103 is determined by: (1) determining the

scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of non-obviousness.

Furthermore, to establish a *prima facie* case of obviousness, the examiner must satisfy three requirements. First, as the U.S. Supreme Court very recently held in *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727 (2007), "a court must ask whether the improvement is more than the *predictable* use of prior art elements according to their established functions. ...it [may] be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason* to combine the known elements in the fashion claimed by the patent at issue. ...it can be important to *identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements* in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." (emphasis added, *KSR, supra*). Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Lastly, the prior art references must teach or suggest all the limitations of the claims. In *re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

In summary, to establish a *prima facie* case of obviousness, the examiner must consider *each* of (a) predictability, (b) an apparent reason to combine the known elements as claimed, (c) a reasonable expectation of success, *and* (d) a teaching of all claimed elements.

The Supreme Court recently identified a number of rationales that may be used to support a conclusion of obviousness, consistent with the framework set forth in its decision in *Graham v. John Deere Co.* See *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1739-40 (2007). These and other representative rationales are described at MPEP §2143 (8th Ed., Rev. 6, Sept. 2007). Regardless of the supporting rationale the Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been

obvious to a person at ordinary skill in the art at least as of the claimed invention's effective filing date. See *KSR Int'l*, 127 S.Ct at 1741 (citing with approval *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); see also MPEP §2143 ("The key to supporting any rejection under 35 USC §103 is the clear articulation of reason(s) why the claimed invention would have been obvious.").

To reach a proper determination under 35 U.S.C. §103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to the person. Knowledge of applicants' disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search, and evaluate the claimed "subject matter as a whole". The tendency to resort to "hindsight" based upon applicants' disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the *facts* gleaned from the prior art. MPEP §2142.

The rationale relied upon by the examiner apparently is as follows:

"A. Combining Prior Art Elements According to Known Methods To Yield Predictable Results

To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Then, Office personnel must articulate the following:

- (1) a finding that the prior art included each element claimed, although not necessarily in a single prior art reference, with the only difference between the claimed invention and the prior art being the lack of actual combination of the elements in a single prior art reference;
- (2) a finding that one of ordinary skill in the art could have combined the elements as claimed by known methods, and that in combination, each element merely performs the same function as it does separately;

(3) a finding that one of ordinary skill in the art would have recognized that the results of the combination were predictable; and

(4) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

The rationale to support a conclusion that the claim would have been obvious is that the substitution of one known element for another would have yielded *predictable results* to one of ordinary skill in the art at the time of the invention. *If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious* to one of ordinary skill in the art." (*Fed. Reg.*, Vol. 72, No. 195, page 57529 (October 10, 2007, emphasis added).

The '600 patent (WO '648) teaches the preparation of an expanded hydrogel by polymerizing a foamed mixture containing monoethylenically unsaturated acidic monomers in the presence of a surfactant. See '600 patent, abstract and column 3, lines 19-60. The '600 patent teaches that the surfactant is "crucial for the production and stabilization of the foam" (column 9, lines 9-10). No other use is disclosed or suggested for the surfactant. See '600 patent, column 9, line 7 through column 10, line 16. In addition, not one of Examples 1-11 and Comparative Examples 1-3 of the '600 patent apply an *additional* amount of surfactant to a surface of the hydrogel foam *after* preparation of the foam (as recognized and admitted by the examiner). The most that the '600 patent discloses is the application of a fine powder to the hydrogel foam to reduce tackiness (column 17, lines 5-20).

The '262 patent (WO '087) is similar to the '600 patent in teaching preparation of a hydrogel foam from acidic monoethylenically unsaturated monomers, in the presence of a surfactant, followed by an optional treatment with a silicon dioxide (see column 4, lines 46-47). Like the '600 patent, the '262 patent fails to teach or suggest the application of a surfactant *to the* hydrogel foam *after* preparation of the foam. The reason for an addition of a surfactant to the monomer mixture is identical to that disclosed in the '600 patent (see '262 patent, column 9, lines 23-24), and no other use is disclosed for the surfactant. More importantly, and as recognized and admitted by the examiner, *no* additional treatment of a surfactant on a surface of the hydrogel foam surface is taught or disclosed in the '262 patent.

The '262 patent does disclose dusting of the hydrogel foam with talc (column 20, lines 46-47) for the purpose of reducing tackiness, as disclosed at column 17, lines 47-60 of the '262 patent.

For the reasons set forth in previously-filed Amendment "A", neither the '600 patent nor the '262 renders the present claims obvious. The '311 publication fails to overcome the deficiencies of the '600 and '262 patents.

The '311 publication is directed to flexible open-celled microcellular foams based on *olefin* polymers or *thermoplastic* polyesters ('311 publication, paragraph [0014]). Various olefin polymers and thermoplastic polyesters are disclosed at paragraphs [0020] and [0025] of the '311 publication. Examples of "suitable" polymers disclosed in the '311 publication are polyethylene, polypropylene, a copolymer of ethylene and propylene with optional minor amounts of acrylic acid, and polyethylene terephthalate.

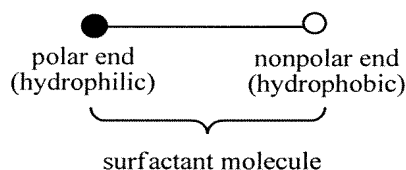
The polymers of the '311 publication therefore are different from the crosslinked acid-functional addition polymer recited in the claims. Not only are the polymers of the '311 publication different from the claimed acid-functional addition polymers in chemical structure, the polymers also differ greatly in properties. First, the claimed polymers are water absorbent polymers, whereas the polymers of the '311 publication are not water-absorbent polymers. Second, and importantly, the *claimed* acid-functional addition polymers are *hydrophilic*, whereas the polymers of the '311 publication are *hydrophobic*.

Because the polymers of the '311 publication are hydrophobic, the '311 publication teaches that the foam should "surface hydrophilicized". See '311 publication, paragraph [0031]. The reference goes on to disclose various methods of generating a hydrophilic layer on a hydrophobic surface at paragraphs [0032] through [0037]. It must be noted that the '311 publication suggests using a hydrophilic (co)polymer to provide a hydrophilic surface (paragraph [0031]), but it is preferred to generate a hydrophilic surface on a hydrophobic foam surface, as in paragraphs [0032] through [0037] of the '311 publication.

It also is important to note that the '311 publication does *not* teach or suggest adding a surfactant to a previously formed hydrophilic polymer (although, like the '600 and

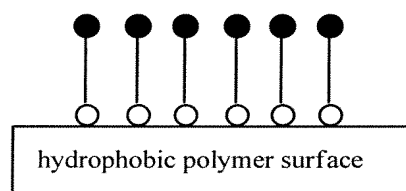
'262 patent, the '311 publication discloses adding a surfactant during foam production). The '311 publication lacks such a teaching because a person skilled in the art simply would not have any incentive or apparent reason to add a hydrophilic agent (e.g., a surfactant) to the surface of a hydrophilic polymer foam, as discussed below.

As is well known in the art, a surfactant has a polar (hydrophilic) end and a nonpolar (hydrophobic) end, illustrated below:



As is also well known in the art, the hydrophobic end of a surfactant is attracted to hydrophobic surfaces, and the hydrophilic end is attracted to hydrophilic surfaces.

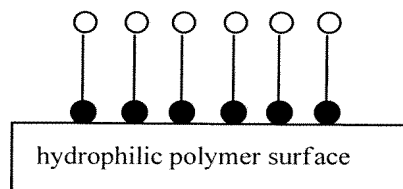
Therefore, in the case of a hydrophobic polymer, e.g., a polyethylene of the '311 publication, a surfactant added to the polymer surface would be aligned as follows, such that the hydrophobic end of the surfactant is attracted to the hydrophobic polymer surface:



The hydrophilic ends of the surfactant extend from the hydrophobic polymer surface thereby rendering the polymer surface hydrophilic, as in the '311 publication. It is the desired generation of a hydrophilic surface that leads to the addition of a surfactant to a hydrophobic polymer, as taught in the '311 publication.

In the case of a hydrophilic polymer, there is *no common sense* reason to add a surfactant because the foam surface is *already* hydrophilic. In addition, persons skilled in the art would expect that the addition of a surfactant to a hydrophilic polymer would *decrease* hydrophilicity, and hence decrease water absorption properties. In particular, when adding a

surfactant to a hydrophilic polymer surface, the surfactant would align itself as follows; such that the hydrophilic end of the surfactant is attracted to the hydrophilic polymer surface:



The hydrophobic ends of the surfactant extend from the hydrophilic polymer surface thereby rendering the polymer surface less hydrophilic (i.e., more hydrophobic), which is expected to reduce water absorption properties.

Accordingly, persons skilled in the art would *not* have been motivated to add a surfactant to a hydrophilic polymer surface with any reasonable expectation of improving water absorption properties. Unexpectedly, the presently claimed foams *do* exhibit improved properties, as discussed below.

It is submitted that a combination of either the '600 patent or the '262 patent together with the '311 publication fails to renders the present claims obvious. First, the cited references provide no incentive or apparent reason to modify the references in a manner that renders the present claims obvious. Second, the references provide no reasonable expectation of success from the claimed features. Third, the presently claimed invention exhibits unexpected benefits.

First, as previously discussed, and as acknowledged by the examiner, neither the '262 nor the '600 patent teaches or suggests application of a surfactant to a surface of a hydrogel foam *after* preparation of a hydrogel foam. These cited references teach that a surfactant is essential as an ingredient of the monomer mixture prior to preparation of the foam. The references however do *not* teach or suggest a post-polymerization application of a surfactant to the foam. The '311 publication teaches the application of a surfactant to a surface of a foam prepared from a *hydrophobic* polymer to render the surface hydrophilic. The '311 publication fails to teach or suggest the application of a surfactant to a surface of a foam prepared from a hydrophilic polymer.

As discussed above, persons skilled in the art would have had no incentive to apply a surfactant to surfaces of a hydrophilic foam because the surface *already is hydrophilic*. Further, as discussed above, persons skilled in the art would actually expect the application of a surfactant of a hydrophilic polymer surface to be *detrimental* because the alignment of surfactant molecules would *decrease* the hydrophilicity of the polymer. Accordingly, there is no apparent, or common sense, reason to combine the individual elements from the references in a way to arrive at the presently claimed invention.

Second, the combination of references provides no incentive for a person skilled in the art to apply a surfactant to a hydrophilic polymer foam with a reasonable expectation of providing *any* beneficial result. In fact, a person skilled in the art would expect to observe detrimental results. In addition to expecting a decrease in absorption properties, surfactants are well known "tacky" materials, and tackiness is a property of the hydrogel foams that the '600 and '262 patents teach to avoid. Therefore, persons skilled in the art also would have had no reasonable expectation of reducing tackiness as disclosed in the '600 and '262 patents by applying a surfactant to surfaces of a hydrophobic polymer foam, as presently claimed.

Furthermore, a person skilled in the art additionally would have had *no apparent reason* to apply a surfactant to an already formed hydrophilic polymer foam. Why would a person skilled in the art have any apparent reason to apply a hydrophilic surfactant to surfaces of a hydrophilic hydrogel foam, when the only apparent result would be an increase in tackiness, and *both* primary references teach that a reduction of tackiness is desired?

It is submitted that a person skilled in the art, having *common sense* at the time the invention was made, would not have reasonably considered applying a surfactant to a hydrophilic polymer foam after considering the '600 patent or the '262 patent, or both, and the '311 publication, thus providing an additional reason why present claims 1-16 would not have been obvious over the '600 patent and/or the '262 patent in combination with the '311 publication.

Third, the present invention demonstrates new and unexpected benefits over the '600 and '262 patents, the closest prior art. As stated above, a person skilled in the art

would have had no incentive to apply a surfactant to a surface of a hydrophilic polymer foam because such an application would provide no apparent benefit (but could be detrimental) and would increase tackiness. Therefore, the cited references teach *away* from applying a surfactant to a surface of a hydrophilic polymer foam.

In addition, the examiner is directed to Example 1 of the '262 patent and to the present specification, Example 1, at page 14, line 10 through page 15, line 10. Example 1 of the '262 patent is *identical* to Example 1 of the present invention, up to the application of an amorphous silica in present Example 1. The present specification, in Example 3, applies a surfactant to surfaces of the hydrogel foam rather than an amorphous silica. The table at page 15 of the present specification shows decrease of time for droplet acquisition from 1.5 seconds for an *untreated* foam (as in Example 1 of the '262 patent) down to 1 second for a foam treated with surfactant (Example 3), i.e., a decrease in acquisition time of about 33%. Such a result is neither taught nor suggested by either cited reference, and is unexpected in view of the '600 and '262 patent and '311 publication disclosures. In addition, persons skilled in the art would have expected a decrease in foam absorption performance by the addition of a surfactant to a hydrophilic polymer surface. Therefore, in view of the objective comparative test results provided by the applicants, a person skilled in the art would recognize that the results stemming from the combined teachings of the cited reference are unpredictable.

Accordingly, for all the reasons set forth above, it is submitted that present claims 1-16 would not have been obvious under 35 U.S.C. §103 over a combination of WO '648 or WO '087 and the '311 publication.

It is submitted that all pending claims are in a form and scope for allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter in form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

By 

James J. Napoli

Registration No.: 32,361
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive, Suite 6300
Sears Tower
Chicago, Illinois 60606-6357
(312) 474-6300
Attorney for Applicant